

Cancer Risk among Population near Nuclear Power Plants in Korea

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To the Editor:

I read with great interest the recent article (1) and subsequent debate (2, 3) regarding the cohort study on cancer risks among those residing near nuclear power plants. Since the issue of health effects among populations living near nuclear facilities is an important topic within public health discourse, further scientific communication would contribute to a more complete understanding of radiation exposure and health. In this light, I would like to add a few comments on this issue.

First, the study objective of the original investigation is indeed a fundamental issue which cannot be dismissed as a 'silly question.' If the study purpose is to identify the cancer risk due to radiation exposure from nuclear power plants, then it is difficult to justify why the original study did not include radiation-sensitive subpopulations such as fetuses or children from the beginning of the study. Also, considering that accurate exposure assessment is a vital component of environmental epidemiology, the simple application of a crude exposure index (i.e., distance from nuclear power plant) in this study raises questions related to the study purpose. I would judge that the main purpose of the original study was to build a prospective cohort of adults for cancer and other diseases rather than one focused on radiation exposure and cancer. Therefore, we need to acknowledge that while this is in fact a well-designed general cohort study, the cohort includes certain limitations for drawing causality with radiation exposure and cancer. Therefore, the results must be analyzed with caution. In my opinion, the results of this study should not be misleadingly interpreted as solid null findings rather than as inconclusive.

Second, I am convinced that conducting a re-analysis of the existing dataset would be a worthwhile undertaking in order to investigate the association in greater depth. This is not a case of right versus wrong, but a natural process of investigating the truth. Existing and future findings together will contribute to a better understanding of the full scope of the radiation effect. A re-analysis study may provide us with valuable distinct approaches and considerations. Continued monitoring of health out-

comes, refinement of exposure assessment, and corresponding updates of analysis are fundamental elements and advantages of cohort studies. Since the government and a number of researchers have dedicated considerable time, effort and funds to this cohort, I believe the existing data, as a national asset, need to be actively applied in support of the public interest. However, we must at the same time acknowledge the limitations of the original cohort which may continue to hinder the investigation of the association between radiation exposure and cancer risk even after applying more sophisticated statistical analyses. Therefore, additional efforts to compensate for the limitations of this study, in particular improving exposure assessment, minimizing exposure misclassification, and conducting new epidemiologic studies focusing on children, are warranted in order to better shed light on the association between radiation exposure from nuclear power plants and the development of cancer.

Third, I would like to point out that there remain certain uncertainties in estimating cancer risk associated with exposure to ionizing radiation. Even the Life Span Study of Japanese atomic bomb survivors, which serves as a quantitative basis for radiation risk estimation worldwide, featured drawbacks including selection bias, immortal bias, and missing information (4). It is difficult to state that a low level of measured radiation can on its own completely guarantee no increased cancer risk for those living near nuclear power plant sites. The discrepancy between measured radiation doses and cancer risk remains mainly unexplained, and a possible hypothesis has been suggested (5). Although the majority of previous studies on cancer risks in populations near nuclear facilities have reported null findings except in the case of childhood leukemia (6), it is the role of epidemiology to clarify this issue of whether or not the observed cancer risk is related with radiation. Therefore, I would like to emphasize the importance of epidemiologic study in combination with surveillance data on radiation doses in populations near nuclear power plants.

I believe that constructive discussions focusing on research itself can further advance radiation epidemiology in Korea and I hope this journal can serve as a means to accomplish this in its basic role as a scientific journal.

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The Authors' Response

Re: Correspondence to 'Cancer risk in adult residents near nuclear power plants in Korea - a cohort study of 1992-2010' (1) & subsequent debate (2, 3)

The correspondent depicted three points of view, just like as a witness's account of the study. All the points insisted, however, are not relevant to our study, particularly to its study hypothesis and conclusion, and believe that there certainly is lack of understanding of our study and the subsequent debates. In short, the correspondence to our study was insufficient. For instance, the 'silly question' (3) did mean criticizing the study objectives or hypotheses by reader, which have already been reviewed by the peer reviewers of the journal when the manuscript had been submitted for publication.

1. As accounted in the title of the paper, our study objectives did not include the 'causality in general' between ionizing radiation and cancer risk, and not cancer risks among children. The main purpose of our study, say again, was to eval-

uate cancer risk in Korean adult residents near NPPs due to radiation emitted, if any, from nuclear power plants in Korea, compared to non-exposed or reference residents.

2. Exposure assessment in nearby residents of the study was conducted at the beginning of the cohort study, 1992-1994 (1), radiation exposure in residents and the three-month cumulative dose of the gamma ray in air. The mean values of the dose investigated were not higher than background level, and not different from the official data monitored by the Korean Institute of Nuclear Safety, and from those of the other areas, e.g. Seoul City. It should be quite unreasonable to argue that the results of the study should not be interpreted as solid null findings. It was found in the study that no difference in radiological exposure assessment and cancer risks, as well. And in further analyses (1), no causal evidence for increased risk of cancer among adult residents near NPPs due to radiation from NPPs in Korea was drawn.
3. The necessity or convincing point of 'reanalysis of the existing dataset' should be addressed logically and specifically at the standpoint of study objectives or conclusion, not 'to investigate the association in greater depth' or 'public interest'. Otherwise, it will make misgivings about hidden intention of using the existing data for their own other purposes.
4. The third point depicted is definitely not relevant to the study hypothesis of our paper. No further response is necessary

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